

From Whom

Place

Date

SUBJECT.

Seasme phenomena.

Connected Papers.

MINUTES.

No Minutes should be written on this page. A separate half-sheet to
be used if required.

Official Memorandum.

(Gen. 67)

From

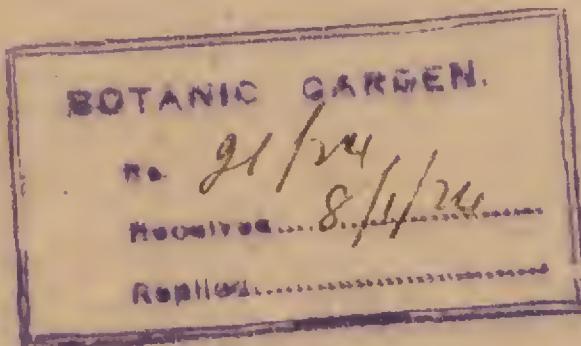
To Director, Botanic Gardens,
Singapore.

Jan. 7, 1923.

Dear Bunkill;

Herewith a copy of a report
which I am sending to all State
Forest Officers. It is chiefly
remarkable as showing how very
meagre our collections have been.

F. W. Foxworth



This term (which is contracted from phenomenology) is defined as, "The science of the relations between climate and periodic biological phenomena, as the migration and breeding of birds, the flowering and fruiting of plants, etc." The term makes a convenient single word reference for our records of the flowering and fruiting times of the different trees and it is proposed to use it as a heading in our files.

2. The Department has been accumulating phenological data for a number of years and a separate register has been kept in which were recorded the notes on flowering and fruiting that were given in forest officers' diaries. A considerably larger amount of information has been found on the field labels accompanying herbarium collections. The time of flowering and fruiting of particular trees may have considerable significance in Silviculture and we have been trying to gather such information for inclusion in descriptions of the different commercial timber trees.

3. Table No.1 has been prepared to include all of our authentic records of the time of flowering and fruiting of our timber trees in different years. The trees included in the timber roll are the principal ones considered. Mengkulang has been added because it is a tree which produces a timber of useful quality and in some quantity, and Tualang, because it is so conspicuous a feature of the landscape, in many places, and is a tree of some popular interest, by reason of its imposing appearance and large size. Much of the largest number of entries in the table have been taken from herbarium collections and represent fully opened flowers and mature fruit. No entry has been made in cases where the stage of flower or fruit development could not be determined.

TABLE No.1
TABLE OF FLOWERING AND FRUITING TIMES.

TREE	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
KAYU ARANG												
flower	:	:	:	x	x	:	x	:	x	x	x	:
fruit	:	;	x	:	;	;	;	x	x	x	x	;
BALAU												
flower	:	:	x	:	x	:	:	:	:	:	:	:
fruit	:	:	:	:	x	:	:	x	x	:	:	:
BELIAN or BETIS												
flower	:	:	x	:	x	:	x	:	x	x	:	:
fruit	:	:	x	:	x	:	x	:	x	x	:	:
BERANGAN												
flower	:	x	:	x	x	:	x	:	x	x	x	:
fruit	:	x	:	x	x	:	x	:	x	x	x	:
BINTANGOR												
flower	:	x	:	x	x	:	x	:	x	x	x	:
fruit	:	x	:	x	x	:	x	:	x	x	x	:
BUNGOR												
flower	:	:	:	x	x	:	x	:	x	x	x	:
fruit	:	:	:	x	:	x	:	x	x	:	:	:
CHENGAL												
flower	:	:	x	:	x	:	x	:	x	x	x	x
fruit	:	x	:	x	x	:	x	:	x	x	x	x
DAMAR HITAM												
flower	:	x	:	x	x	:	x	:	x	x	x	:
fruit	:	x	:	;	;	:	x	:	x	x	x	:
DAMAR LAUT												
flower	:	:	:	:	:	:	:	:	:	x	:	x
fruit	:	:	:	:	:	:	:	:	x	x	x	x
DEDALI												
flower	:	x	:	x	:	:	x	:	x	x	x	:
fruit	:	:	:	:	:	:	x	:	x	x	x	:
DEDARU												
flower	:	:	:	:	:	:	:	:	:	x	:	x
fruit	:	:	:	:	x	:	x	:	x	:	x	:
DURIAN DAUN												
flower	:	:	:	:	x	:	x	:	x	x	x	:
fruit	:	:	:	:	;	:	;	:	x	x	x	x
GADING												
flower	:	x	:	x	x	:	x	:	x	:	x	:
fruit	:	x	:	;	x	:	;	x	:	x	:	x
GERONGGANG												
flower	:	:	;	x	:	:	x	:	x	:	x	:
fruit	:	:	;	x	x	:	;	x	x	:	x	:
GLAM												
flower	:	:	:	:	x	:	:	x	:	:	x	:
fruit	:	:	:	:	;	:	;	x	:	:	x	:
JELUTONG												
flower	:	:	:	x	x	:	x	:	x	x	x	:
fruit	:	:	:	;	x	:	;	x	:	x	x	:
KAMAP or PETALING GAJAH												
flower	:	:	:	:	:	:	x	:	x	x	x	:
fruit	:	:	:	:	x	:	;	x	:	x	x	:
KAPUR												
flower	:	:	:	:	x	:	x	:	x	x	x	:
fruit	:	x	:	x	x	:	x	:	x	x	x	:
KELADAN												
flower	:	:	:	x	x	:	x	:	x	x	x	:
fruit	:	x	:	;	x	:	;	x	x	x	x	:
KELAT												
flower	:	x	:	x	x	:	x	:	x	x	x	:
fruit	:	x	:	x	x	:	x	:	x	x	x	:
KELEDANG												
flower	:	:	:	:	:	x	:	x	:	x	x	:
fruit	:	:	:	:	:	x	:	x	:	x	x	:

TABLE No. 1.
FLOWERING AND FRUITING TIMES (continued).

TREE	:Jan	:Feb	:Mar	:Apr	:May	:Jun	:Jul	:Aug	:Sep	:Oct	:Nov	:Dec
KEMPAS												
flower	:	:	:	:	:	:	:	:	:	:	:	:
fruit	:	x	:	x	:	x	:	x	:	x	:	x
KEMUNING												
flower	:	:	:	x	:	x	:	x	:	x	:	x
fruit	:	:	:	x	:	x	:	x	:	x	:	x
KETENGGEH												
flower	:	x	:	:	:	:	:	:	:	:	:	:
fruit	:	:	x	:	x	:	x	:	x	:	x	:
KERANJI												
flower	:	x	:	x	:	x	:	x	:	x	:	x
fruit	:	x	:	:	:	:	x	:	x	:	x	:
KERUING												
flower	:	x	:	x	:	x	:	x	:	x	:	x
fruit	:	x	:	x	:	x	:	x	:	x	:	x
KULIM												
flower	:	:	x	:	x	:	:	x	:	:	:	:
fruit	:	:	:	:	:	x	:	x	:	x	:	x
KUMUS												
flower	:	:	:	:	:	x	:	x	:	x	:	x
fruit	:	:	:	:	:	:	x	:	x	:	x	:
KUNGKUR												
flower	:	:	:	:	:	:	:	:	:	:	:	:
fruit	:	:	:	:	:	:	:	x	:	:	:	:
LEBAN												
flower	:	x	:	x	:	x	:	x	:	x	:	x
fruit	:	x	:	x	:	x	:	x	:	x	:	x
MALABERA												
flower	:	:	x	:	:	x	:	x	:	x	:	x
fruit	:	:	:	:	x	:	x	:	x	:	x	:
MEDANG												
flower	:	x	:	x	:	x	:	x	:	x	:	x
fruit	:	x	:	x	:	x	:	x	:	x	:	x
MEMPENDING												
flower	:	x	:	x	:	x	:	x	:	x	:	x
fruit	:	x	:	x	:	x	:	x	:	x	:	x
MENGKULANG												
flower	:	:	:	x	:	x	:	x	:	x	:	x
fruit	:	:	:	x	:	x	:	x	:	x	:	x
MERANTI												
flower	:	x	:	x	:	x	:	x	:	x	:	x
fruit	:	x	:	x	:	x	:	x	:	x	:	x
MERANTI PAHANG												
flower	:	x	:	x	:	:	x	:	x	:	x	:
fruit	:	:	:	:	:	:	x	:	x	:	x	:
MERAWAN												
flower	:	:	x	:	x	:	x	:	x	:	x	:
fruit	:	x	:	x	:	x	:	x	:	x	:	x
MERBAU												
flower	:	x	:	x	:	x	:	x	:	x	:	x
fruit	:	:	x	:	x	:	x	:	x	:	x	:
MERSAWA												
flower	:	:	:	x	:	x	:	x	:	x	:	x
fruit	:	x	:	:	:	x	:	x	:	x	:	x
NYATOH												
flower	:	x	:	x	:	x	:	x	:	x	:	x
fruit	:	x	:	x	:	x	:	x	:	x	:	x
PENAGA												
flower	:	x	:	x	:	x	:	x	:	x	:	x
fruit	:	x	:	x	:	:	x	:	x	:	x	:
PENAGA LAUT												
flower	:	:	:	x	:	x	:	x	:	x	:	x
fruit	:	x	:	:	:	x	:	x	:	x	:	x

TABLE NO. 1.
FLOWERING AND FRUITING TIMES (continued).

TREE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
<u>PETALING</u>												
	flower:	:	x	:	x	:	x	:	x	:	x	:
	fruit:	x	:	x	:	x	:	x	:	x	:	x
PUNAH												
	flower:	:	x	:	x	:	x	:	x	:	x	:
	fruit:	:	x	:	x	:	x	:	x	:	x	:
PUNGGAI												
	flower:	:	x	:	:	x	:	:	x	:	:	:
	fruit:	:	:	:	x	:	:	x	:	x	:	x
RENGAS												
	flower:	x	:	x	:	x	:	x	:	x	:	x
	fruit:	x	:	x	:	x	:	x	:	x	:	x
RESAK												
	flower:	:	:	x	:	x	:	x	:	x	:	x
	fruit:	x	:	x	:	x	:	x	:	x	:	x
RU												
	flower:	:	:	:	x	:	x	:	x	:	x	:
	fruit:	:	:	:	x	:	x	:	x	:	x	:
SELIMBAR												
	flower:	:	:	:	:	:	:	:	:	:	:	:
	fruit:	:	:	:	:	:	:	x	:	:	:	:
SENA												
	flower:	:	:	:	x	:	x	:	x	:	x	:
	fruit:	:	:	:	x	:	x	:	x	:	x	:
SENGKAWANG												
	flower:	:	:	x	:	:	x	:	x	:	x	:
	fruit:	:	x	:	:	:	:	:	:	:	x	:
SEPETIR												
	flower:	:	:	:	x	:	x	:	x	:	x	:
	fruit:	x	:	:	:	:	x	:	x	:	x	:
SERAYA												
	flower:	:	:	:	:	x	:	x	:	x	:	x
	fruit:	:	:	:	:	x	:	x	:	x	:	x
SIMPOH												
	flower:	x	:	x	:	x	:	x	:	x	:	x
	fruit:	:	x	:	:	x	:	:	x	:	x	:
SURYAN												
	flower:	:	x	:	:	:	:	:	:	:	:	:
	fruit:	:	:	:	:	:	:	:	x	:	:	:
TEMBUSU flower												
TEMBUSU												
	flower:	x	:	:	x	:	x	:	x	:	x	:
	fruit:	:	x	:	:	x	:	x	:	x	:	x
TEMPINIS												
	flower:	x	:	x	:	x	:	x	:	x	:	x
	fruit:	x	:	x	:	x	:	x	:	x	:	x
TERENTANG												
	flower:	x	:	x	:	x	:	x	:	x	:	x
	fruit:	:	x	:	:	x	:	x	:	x	:	x
TUALANG												
	flower:	:	:	:	x	:	x	:	x	:	x	:
	fruit:	:	:	:	x	:	x	:	x	:	x	:

The most outstanding feature of this table is the distribution of flowering and fruiting times throughout the year and the apparent lack of definite flowering and fruiting seasons. The average number of entries for all forms in the table is a little more than six months for flowering and a little more than 6 months for fruiting. In several cases, as Damar Laut, Damar Kitam, Selimbar, Kumus, and Tualang, there are very few entries because there has been very little collecting of these forms; otherwise, the average number of entries would be larger. Kelat, Keruing, Nedang, Mempening, and Meranti have been collected in flower and in fruit in every month of the year, and a number of others have been collected in nearly every month. Most of these names represent a group of species, but Chengal, which is one species, has been collected in fruit in every month of the year and in flower in every month but January. There are 364 entries of flowering and 363 of fruiting. A separate tabulation by months has been made to see if that would give any indication of seasons. -

Month	Flower entries	Fruit entries	Total
January	22	24	46
February	27	26	53
March	32	22	54
April	36	20	56
May	41	33	74
June	38	28	66
July	28	33	61
August	32	47	79
September	32	35	67
October	30	34	64
November	19	26	45
December	27	37	64
	364	363	727

From this it would seem that May is the greatest month for flower and August for fruit. This is probably due to the entries from the east coast, where the seasons are more marked. The average number of entries per month is just over 60, and the only months which fall far below this number are January and November. There does not seem enough evidence here to warrant the conclusion that there are any sharply marked seasons.

4. A separate table, No. 2, has been prepared to show the records for 1923 and the places from which the records come. The reports have been made principally by this office and by the Forest Departments in Johore and Kedah.

TABLE No. 2.
FLOWERING AND FRUITING OF TIMBER TREES
in the Malay Peninsula in
1923.

	Flowering	Fruiting		
	Month:	Place	Month:	Place
<u>Kayu Arang</u>	: Oct. : Weld Hill		: Aug. : Kuantan	
<u>Bellion</u>			: Aug. : Kuantan & Rompin	
<u>Balau</u>	: :		: Sept. : Rompin.	
<u>Belian or Betis</u>		No report		
<u>Berangan</u>	: May : Ulu Gombak, Sel.		: March: Kuala Lipis	
			: July : Weld Hill	
			: Aug. : Weld Hill	
<u>Bintangor</u>	:March: Johore		:Jan. : Kedah & Johore	
	:Sept.: Fraser's Hill		:Feb. : Kuala Lipis & Temerl	
	:Oct. : Chikus Res., Perak		:March: Johore	
<u>Bungor</u>	:April: Larut			
	:June : Kedah			
	:July : Johore			
<u>Chengal</u>	:Feb. : Kedah		:Jan. : Taiping, Kuala Pilah	
	:April: Larut & Sungai Buloh	:Feb.: Kedah		
	:Dec. : Larut		:March: Kuala Pilah	
			:April: Sungai Buloh	
			:June : Kuala Pilah	
			:Aug. : Raub, Kuantan	
			:Nov. : Kuala Pilah	
			:Dec. : Kuala Pilah	
<u>Damar Hitam</u>	:May : Penang			
<u>Damar Laut</u>	:		:Aug. : Prov. Wellesley	
<u>Dedali</u>	:Aug. : Weld Hill		:Aug. : Weld Hill	
<u>Dedaru</u>	:		:April: Johore	
			:May : Johore	
<u>Durian Daun</u>	:May : Sungai Buloh		:July : Johore	
<u>Gading</u>		No report.		
<u>Geronggang</u>	:Sept : Fraser's Hill		:Nov. : Kuala Lumpur	
<u>Giam</u>		No report.		
<u>Jelutong</u>	:April: Larut		:May : Weld Hill	
	:May : Weld Hill & Sungai Buloh.			
<u>Kamap</u>		No report.		
<u>Kapur</u>	:April: Johore		:March: Ulu Selangor	
			:May : Johore	
			:June : Johore	
<u>Keladan</u>	:May : Johore		:July : Johore	
			:Aug. : Johore	
<u>Kelat</u>	:Feb. : Johore		:March: Kedah & Ulu Selangor	
	:March: Weld Hill		:April: Weld Hill & Sungai Bul	
	:April: Johore, Ulu Langat, Sungai Buloh.		:Juno : Johore	
	:May : Kuala Lumpur & Johore			
	:June : Kuala Lumpur & Johore			
	:Aug. : Kuala Lipis			
	:Sept.: Fraser's Hill.			

PHENOLOGICAL CHART (continued)

TREE	Flower	Fruit	
:Month:	Place	:Month:	Place
<u>Koledang</u>	<u>: June : Kedah</u>		<u>: July : Kedah</u>
<u>Kempas</u>	:		<u>: Jan. : Johore</u> <u>: March : Ulu Selangor</u> <u>: July : Johore</u> <u>: Aug. : Raub</u> <u>: Sept. : Kuala Lumpur</u> <u>: Oct. : Ginting Simpah</u> <u>: Nov. : Sungai Buloh</u>
<u>Kemuning</u>			<u>No report.</u>
<u>Ketenggeh:</u>	:		<u>: June : Kedah</u> <u>: July : Weld Hill</u> <u>: Nov. : Weld Hill.</u>
<u>Keranji</u>	<u>: June : Kuantan</u>		<u>: Dec. : Taiping</u>
<u>KEKUING</u>	<u>: Feb. : Kedah</u> <u>: May : Johore</u> <u>: June : Kuantan</u> <u>: July : Johore</u> <u>: Sept. : Fraser's Hill</u> <u>: Nov. : Weld Hill</u>	<u>: Jan. : Klang</u> <u>: Feb. : Kelantan, Sungai Buloh</u> <u>: March : Johore, Temerloh</u> <u>: April : Johore</u> <u>: May : Penang, Johore</u> <u>: June : Johore</u> <u>: July : Johore, Malacca</u> <u>: Aug. : Raub, Kuala Lipis, Kuantan, Malacca.</u> <u>: Sept. : Fraser's Hill</u> <u>: Oct. : Ginting Simpah</u> <u>: Nov. : Sungai Buloh</u> <u>: Dec. : Sungai Buloh.</u>	
<u>KULIM</u>	:		<u>: July : Kedah</u> <u>: Aug. : Kuantan</u> <u>: Nov. : Kuala Kangsar</u>
<u>KUMUS</u>	:		<u>: Aug. : Kuantan</u>
<u>KUNGKUR</u>	<u>No report.</u>		
<u>LEBAN</u>	<u>: April : Kuala Lipis, Ulu Langat</u> <u>: May : Kuala Lipis & Johore</u>	<u>: April : Kuala Lipis</u> <u>: May : Kuala Lipis, Johore</u>	
<u>MALABERA</u>	<u>: June : Kedah & Klang</u> <u>: July : Kedah & Kuala Lumpur</u>	:	
<u>MEDANG</u>	<u>: Jan. : Kedah</u> <u>: Feb. : Kuala Lipis</u> <u>: March : Weld Hill</u> <u>: April : Ulu Langat, Sungai Buloh</u> <u>: May : Weld Hill</u> <u>: June : Kuantan</u> <u>: Sept. : Fraser's Hill</u>	<u>: June : Kedah</u> <u>: July : Johore</u> <u>: Aug. : Sungai Buloh</u> <u>: Sept. : Fraser's Hill</u> <u>: Oct. : Kedah</u> <u>: Dec. : Larut</u>	
<u>MEMPENING</u>	<u>: Jan. : Sungai Buloh</u> <u>: Feb. : Kuala Lipis</u> <u>: April : Sungai Buloh & Ulu Langat</u> <u>: Sept. : Fraser's Hill</u> <u>: Aug. : Weld Hill</u>	<u>: April : Johore & Sungai Buloh</u> <u>: May : Johore</u> <u>: July : Johore, Kuala Lumpur</u> <u>: Aug. : Raub</u> <u>: Sept. : Fraser's Hill</u> <u>: Dec. : Sungai Buloh.</u>	

PHENOLOGICAL CHART (continued)

PHENOLOGICAL CHART (continued)

TREE	Flower		Fruit	
	Month:	Place	Month:	Place
KAYU RU	: Aug.	: Kuantan	: Aug.	: Kuantan
SELIMBAR	:	:	: Aug.	: Kuantan
SENA	: June	: Kedah	: May	: Kuala Lumpur
	: May	: Jugra	: July	: Kuala Lumpur
SENGKAWANG	No report.			
SEPETIR	: :		: June	: Sungai Buloh
	: :		: July	: Johore
SERAYA	: Sept.	: Ulu Gombak	: Sept.	: Ulu Gombak
	: :		: Oct.	: Ginting Simpah
SIMPOH	: Feb.	: Kedah	: Aug.	: Weld Hill
	: May	: Johore	: Nov.	: Malacca
	: July	: Johore	: Dec.	: Malacca
SURYAN	No report.			
TEMBUSU	: May	: Kuala Lumpur, Tampin	: Dec.	: Sungai Buloh
	: June	: Kedah, Sungai Buloh		
TERENTANG	: April	: Ulu Langat	: May	: Kuala Lumpur
TEMPINIS	: Feb.	: Upper Perak		
	: April	: Ulu Langat		
	: June	: Weld Hill		
	: Nov.	: Kuala Lumpur		
TUALANG	: June	: Kuantan	: Aug.	: Kuantan, Kuala Lipis
	: :		: Sept.	: Kuantan

Number of Entries by districts or States.

Selangor	96	Negri Sembilan	7
Johore	53	Malacca	7
Pahang West	34	Penang	5
Pahang East	26	Kelantan	2
Kedah	18	Dindings	2
Perak North	13	Prov. Wellesley	1
Perak South (Chikus Res.)	4		

Doubtless the record would show a much larger number of entries if more people had been making observations. As it stands, it can only be assumed to be a very partial record of what has happened. It, however, shows that Keruing has been found in fruit during every month of the year, Meranti in nine months, and Chengal in eight months. Chengal represents a single species.

5. In order to show how the records appear when applied to particular species, the following table, No. 3, has been prepared to show the records for 1923 of certain of the better known species of Meranti.

TABLE 3.
FLICKERING AND FRUITING OF CERTAIN OF THE COMMONER
SPECIES OF MERANTI DURING 1923.

SPECIES	Flower		Fruit	
	: Month:	Place	: Month:	Place
MERANTI				
<i>M. RAMBAI DAUN</i>	: April	Ulu Langat	: :	:
<i>S. acuminata</i>	: June	Kuantan	: :	:
<i>M. PA-ANG</i>	: Jan.	Dindings	: March	Dindings
<i>S. bracteolata</i>	: April	Ulu Langat, Johore	: June	Penang, Sungai Buloh, Johore.
	: May	Johore, Sungai Buloh	: Oct.	Ginting Simpah, Chikus Res., Perak
	: Sept.	Chikus Res., Perak	: Nov.	Sungei Buloh, Kuala Kangsar.
	: Oct.	" " "	: Dec.	Sungei Buloh, Seremban.
MELANTAI				
	: April	Kuantan	: Feb.	Kanching
<i>S. macroptera</i>	: :		: May	Johore
			: June	Kuantan, Johore.
			: July	Johore
			: Aug.	Kuantan, Kuala Lipis.
<i>M. TEMBAGA</i>	: June	Kuantan	: May	Johore
<i>S. leprosula</i>	: July	Johore	: July	Johore
	: Sept.	Sungei Buloh	: Aug.	Kuantan, Kuala Lipis
	: Nov.	Sungei Buloh	: Oct.	Ginting Simpah
			: Nov.	Sungei Buloh.
<i>M. SARANG PUNAI</i>	: Oct.	Sungei Buloh	: May	Johore
<i>S. parvifolia</i>			: June	Johore, Sungai Buloh
			: Nov.	Kuala Kangsar, Kuala Lumpur, Sungai Buloh.

It is apparent from this table that the fruiting season has not been sharply marked in all cases. During August there was very pronounced fruiting of a number of species of Meranti and Keruing in eastern Pahang, but the same species were not apparently in either flower or fruit at that time in parts of the west coast. Some trees of Meranti Pa-ang and Meranti Sarang Punai fruited at Sungai Buloh in June and other trees of the same species during November or December. I am inclined to believe

I believe that the very local fruiting which is sometimes observed on the west coast is correlated with the very local distribution of rainfall. It seems that a more or less prolonged dry period followed by a warm soaking rain will bring a number of trees into flower, whatever the time of the year. Flowering is so very local that different trees of the same species and growing only a few miles, or even a few hundred yards, apart may flower and fruit at times several months apart. Another thing brought out by this work is the extremely meagre information that we have. It is hoped that more extended observations will be made the coming year, so that we can prepare a much more representative phenological report at the end of the year. It is probable that nearly all of our species of timber trees will be found in flower during the year, if they are watched in every district.

6. Recommendations concerning future observations.

Reports should state whether flowering or fruiting seems to be general or sporadic. Chengal has most often been observed to flower sporadically, only a fraction of the mature trees in a given area flowering at one time, while Kapur has more often been observed in general flower, although there have been observations made when it was only flowering sporadically.

It would be very useful if State Forest Officers would require reports of flowering or fruiting of the principal species from each of their districts. This might help us to determine whether there are any general rules governing the occurrence of flower and fruit in particular places.

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